



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/758,822

01/16/2004

Vahid Goudarzi

CE11518JGN

7130

7590

05/30/2006

Scott M. Garrett
Motorola, Inc.
Law Department
8000 West Sunrise Boulevard
Fort Lauderdale, FL 33322

EXAMINER

NGUYEN, HOA CAO

ART UNIT

PAPER NUMBER

2841

DATE MAILED: 05/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/758,822

Applicant(s)

GOUDARZI, VAHID

Examiner

Hoa C. Nguyen

Art Unit

2841

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6, 8-22 and 24-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-22 and 24-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. The amendment filed on 3/20/06 has been entered. Applicant has amended the specification, drawings, and claims 1, 3, 4, 6, 13, 17, 24, 26, 27 and 30. Claims 7 and 23 are cancelled.

Drawings

2. The amended drawing filed on 3/20/06 is approved. The objections to the drawing are withdrawn.

Specification

3. The amended specification filed on 3/20/06 is approved. The objections to the specification are withdrawn.

Claim Objections

4. Claims 1, 13, 20 and 24 are objected to because of the following informalities:
The "... the solder **past** ..." must be changed to "... the solder **paste** ...".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 3-6, 8-13, 24 and 26-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Tanabe et al. (US 6902102).

Art Unit: 2841

Regarding claim 1, as shown in figures 5, 12 and 17, Tanabe et al. disclose a printed wiring board (PWB) comprising:

(a) A major surface (top surface of circuit board 10 for example);

(b) a plurality of copper pads 14 and 171 (soldering/copper lands, col.8: 20-24 and 52-57, col.21:37, and col.30:51) on the major surface,;

(c) a plurality of electronic components 12, 16, 18, and 175 (col.21:52-67 and col.31:19-28) which are inherently including one or more microchips, discrete components, electrical connectors, and EMI shields;

(d) a plurality of solder joints 150 (solder fillets, col.9:49-59, and col.22:32) formed between the copper pads and the electronic components;

(e) the solder joints comprising a lead-free solder (col.30: 62-64),

(f) the solder joints are formed by:

- coating the copper pads with an organic solderability preservative (organic solvent - organic activator for soldering, col.2:28-34, col.3:59-65, and col.35:25-36),

- depositing a solder paste 150 (solder fillet, col.22:32 and col.18:24-34) that includes the lead-free solder over the organic solderability preservative (col.3:59-65, col.21:45-58, col.30:41-67),

- and heating the PWB in an air atmosphere (figure 13 and col.23:44-52, col.24:3-9, col.24:61-64); and

Art Unit: 2841

(g) a ratio of the solder paste thickness to the minimum inter-pad spacing is at least 0.5 (bottom figure 12, at component 18, the thickness of fillet 150 is larger than half the inter-pad spacing).

Examiner remarks: Figure 12 does not show the scale of the pad spacing relating to the thickness of the solder. However, one ordinary skill in the art would recognize that the thickness of solder fillet 150 is larger than the spacing of pads 14. Furthermore, Tanabe et al. disclose an evaluation of solder property and flow soldering in column 31, line 63 continuing column 33, line 55, suggesting that the limitation between the solder paste thickness in relation with the inter-pad spacing is within an ordinary routine skill in the art. Moreover, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

It is further noted that, the limitations regarding the method of fabricating the solder joint (limitation 1(f) above) is a process limitation in a product claim and is treated in accordance with MPEP 2113. As this process limitation results in a product structure that is the same as the product of Tanabe et al., then Tanabe et al. anticipate the limitation.

Regarding claim 3, Tanabe et al. disclose the solder essentially consisting of one or more materials selected from the group including silver, tin, and copper, see column 30, lines 53-54.

Regarding claim 4, Tanabe et al. disclose the solder paste comprises rosin mildly activated flux for use as a flux activator, see column 35, lines 20-24.

Regarding claim 5, Tanabe et al. disclose a solder paste of 1.6 mm thickness, see column 18, line 32 and lines 53-55.

Regarding claim 6, Tanabe et al. disclose the solder comprises tin, silver and copper where copper is 0.75% and more than 90% is preferable which is inherently disclosed the limitation of 95.1-95.9% tin and 3.6-4.0% silver (see column 30, lines 62-64), the solder paste comprises rosin mildly activated flux (flux activator, claim 4 above), and the solder paste has a thickness of 1.6 mm (claim 5 above) when applies to the copper pads coated with the organic solderability preservative.

Regarding claims 8-9, Tanabe et al. disclose every limitation as shown in claim 1 above including shields and electrical connectors.

Regarding claim 10, Tanabe et al. disclose every limitation as shown in claim 1 above including organic solderability preservative on the copper pads.

Regarding claim 11, Tanabe et al. disclose the solder comprises tin, silver and copper where copper is 0.75% and more than 90% is preferable which is inherently disclosed the limitation of 95.1-95.9% tin and 3.6-4.0% silver, see column 30, lines 62-64.

Regarding claim 12, Tanabe et al. disclose the solder comprises copper and the copper is present in an amount of 0.75%, see column 30, line 54.

Regarding claim 13, Tanabe et al. disclose a method of manufacturing a PWB comprising;

(a) Manufacturing a PWB that comprises a plurality of copper pads including exposed copper surfaces, as shown in claim 1(b) above;

Art Unit: 2841

(b) coating the copper pads with an organic solderability preservative, as shown in claim 1(f) above;

(c) depositing a solder paste that includes a lead-free solder on the organic solderability preservative coated copper pads, as shown in claim 1(d)-(g) above including a ratio of the solder paste thickness to the minimum inter-pad spacing is at least 0.5 (also see examiner remarks in claim 1);

(d) positioning a plurality of circuit components on the PWB, such that contact areas 176 (lead terminal) of the components are in contact with the solder paste 173, see figure 17C and column 31, lines 8-18;

(e) heating the PWB to a temperature above a liquidous temperature of the lead-free solder in an air atmosphere, as shown in claim 1(f) above.

Regarding claim 24, Tanabe et al. disclose a method of manufacturing a PWB comprising:

(a) Fabricating a PWB that includes a plurality of copper pads, as shown in claim 1(b) above;

(b) coating the copper pads with an organic solderability preservative, as shown in claim 1(f) above;

(c) depositing one or more oversized patches of a solder paste (considering the solder paste of 1.6 mm as an oversized patch - see claim 5 above) that include a lead-free solder on the organic solderability preservative coated copper pads (as shown in claim 1(d)-(g) above) and a ratio of the solder paste thickness to the minimum inter-pad spacing is at least 0.5 (see examiner remarks in claim 1);

Art Unit: 2841

(d) placing one or more electrical components on the PWB, such that contact areas 176 (lead terminal) of the components are in contact with the solder paste 173 overlying the copper pads, see figure 17C and column 31, lines 8-18;

(e) heating the PWB to a temperature above a liquidous temperature of the lead-free solder in an air atmosphere, as shown in claim 1(f) above.

Regarding claim 26, Tanabe et al. disclose the solder essentially consisting of one or more materials selected from the group including silver, tin, and copper, see column 30, lines 53-54.

Regarding claim 27, Tanabe et al. disclose the solder paste comprises rosin mildly activated flux for use as a flux activator, see column 35, lines 20-24.

Regarding claims 28-29, Tanabe et al. disclose a plurality of electronic components 12, 16, 18, and 175 (col.21:52-67 and col.31:19-28) which are inherently including one or more microchips, discrete components, electrical connectors, and EMI shields.

Regarding claim 30, Tanabe et al. disclose the solder comprises tin, silver and copper where copper is 0.75% and more than 90% is preferable which is inherently disclosed the limitation of 95.1-95.9% tin and 3.6-4.0% silver, see column 30, lines 62-64.

Regarding claim 31, Tanabe et al. disclose the solder comprises copper and the copper is present in an amount of 0.75%, see column 30, line 54.

Claim Rejections - 35 USC § 103

Art Unit: 2841

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 2, 14-22 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanabe et al. (US 6902102), and claim 18 is rejected in view of Kim et al. (US 6479755).

Regarding claims 2, 14 and 25, Tanabe et al. disclose every limitation as shown in claims 1, 13 and 24 above, but failed to disclose the inter-pad spacing of less than 0.25 mm.

It is old and known in the art that IC chips having inter-pin or contact pad spacing of less than 0.25 mm are available commercially. Thus, the pads or land spacing must fit the contact elements of the chips.

Therefore, it would be obvious to one of ordinary skill in this art at the time of invention to have made an inter-pad spacing of less than 0.25 mm in order to mount

Art Unit: 2841

electronic components that have lead terminals' spacing of less than 0.25 mm.

Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routing skill in the art. In re Aller, 105 USPQ 233.

Regarding claims 15 and 16, Tanabe et al. disclose organic solderability preservative for coating of the copper pads to protect the copper from oxidation and also as an activator. The organic solderability preservative includes antioxidant and other additives (conventional activator), see column 19, lines 45-47. It is also noted that organic base solderability preservation is well known in the art for coating copper pad against oxidation before processing of soldering. The group of antioxidant compound containing benzimidazole, benzotriazoles, and imidazole is an organic base antioxidant compound, which is well known for coating copper. Therefore, it is inherently that the conventional activator includes the substituted benzimidazole, benzotriazoles, and imidazole.

Regarding claim 17, Tanabe et al. disclose the heating the PWB to a temperature above a liquidous temperature of solder for 60 seconds, see column 32, lines 9-13.

Regarding claim 18, Tanabe et al. disclose every limitation as shown in claims 1, 13 and 14 above but failed to disclose the using of non step down stencil; even through, depositing solder paste by using a stencil is well known in the art for reflowing soldering.

(a) Kim et al. disclose a board surface-mounting device including a plurality of conductive leads 22 mounted on and electrically connected to a plurality of conductive pads 36 and 40 formed on a surface 12 of circuit board 10. The conductive pad is coated with solder deposit 50. The solder deposit is a solder paste and formed by using a stencil. See column 1, lines 24-40 and column 4, line 67 continuing column 5, line 1, and figures 1 and 2.

(b) It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the teaching of Kim et al. on the PWB of Tanabe et al., because stencil is simple and cheap to manufacture and if only one surface is used for mounting electronics components instead of both surfaces as disclosed by Tanabe et al. Furthermore, depending on a typical application, if a uniform soldering is required, a non-step down stencil is used; otherwise, and a step down stencil is used if the thickness of solder paste is varied.

Regarding claim 19, Tanabe et al. disclose every limitation as shown in claims 1 and 14 above, wherein: positioning a plurality of electronic components 12, 16, 18, and 175 (col.21:52-67 and col.31:19-28) on the PWP inherently comprises positioning one or more components selected from a first group consisting of electrical connectors and shields on the PWB, and one or more components selected from a second group consisting of microchips and discrete components.

Regarding claim 20, Tanabe et al. disclose every limitation as shown in claims 3 and 14 above wherein: depositing a solder paste that includes a lead-free solder on the organic solderability preservative coated copper pads (as shown in claim 1(d)-(g)

Art Unit: 2841

above) comprises depositing a solder paste that includes a solder that consists essentially of one or more materials selected from the group consisting of tin, silver and copper.

Regarding claim 21, Tanabe et al. disclose every limitation as shown in claims 4 and 20 above wherein: depositing a solder paste that includes the solder that consists essentially of one or more materials selected from the group consisting of tin, silver and copper comprises depositing a solder paste that comprises a rosin active solder flux.

Regarding claim 22, Tanabe et al. disclose depositing a solder paste that include lead free solder (see claim 1 above) on the organic solderability preservative coated copper pads comprises a solder that comprises tin and silver, see column 30, line 55.

Response to Arguments

10. Applicant's arguments with respect to claims 1-31 have been considered but are moot in view of the new ground(s) of rejection with the same references art.

Conclusion


11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoa C. Nguyen whose telephone number is 571-272-8293. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kammie Cuneo can be reached on 571-272-1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2841

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hoa C. Nguyen
5/25/06



KAMAND CUNEO
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800